California Bureau of Home Furnishings and Thermal Insulation
TB 604 Laboratory Criteria and Specifications
Inter-laboratory Precision and Bias Study-2006
(January 2006)

Facility

Laboratory must be capable of safely and accurately performing bench-scale flammability analysis of combustible mock-up samples (fabric covers and filling materials) of bedclothing products (comforters, pillows and mattress pads) weighing up to but no greater than 1 pound, when ignited with a small open flame and allowed to burn for over 6 minutes.

Test Facility/Exhaust System

The test area/room should have a volume greater than 20 cubic meters in order to contain sufficient oxygen for testing. Test area may be smaller if it is equipped with air inlet and extraction systems permitting the necessary flow of air. Air flow rate shall be below 0.2 meters per second measured in the locality of the test specimen. Air flow rates below this value have been shown to provide adequate oxygen without physically disturbing the burning behavior of the ignition source or the specimen. Test specimen should be positioned to provide adequate air without disturbing burning behavior.

Exhaust system should be capable of efficiently extracting smoke and combustion gases from the test area once a test is complete. During the test run, there should be no forced convection and the standard flow of air should not exceed 0.2 meters per second. A variable speed exhaust fan, which allows ramping up of air exhaust volume after testing is recommended but not necessary. When available, the fan allows the airflow to be adjusted so that smoke and exhaust fumes are removed quickly after a test. If used, the time at which the airflow is ramped up should be recorded to correlate to test performance. If a variable speed exhaust fan is not available, an exhaust flow rate control device such as a mechanical damper is required to adjust the exhaust flow rate to stay within test parameters.

Air velocity measuring device- A hot wire anemometer or other velocity measuring device is recommended to measure air flow in meters or feet per second across the hood face.

Safety Hazard Mitigation- Due to potential risks from fire associated with the conduct of any fire test, personnel should follow all applicable OSHA and NIOSH regulations and standard operating procedures and should be equipped with appropriate breathing apparatus and adequate protective fire-resistant clothing, safety goggles, etc. and any other needed as equipment.

Personnel should exercise due diligence in avoiding exposure to irritating and toxic smoke and gases produced during testing.

A suitable fire extinguisher should be on hand at all times. At the point in the test where measurements may cease, the fire may be extinguished. Carbon dioxide is recommended and allows short bursts to extinguish the fire with minimal sample disruption. Water should not be used except in an emergency and halon extinguishers should not be used at all. The fire extinguisher used for these samples must be dedicated to TB 604 testing and can be reused without charging until depleted. This extinguisher is in addition to the normal extinguisher required in this lab area to meet routine fire safety requirements. The normal extinguisher would only be used as a backup in an emergency if the fire could not be put out with the dedicated extinguisher.

Laboratory personnel should have adequate experience and expertise to be able to recognize patterns of fire growth, propagation and decay and to make decisions on when to extinguish a fire to avoid injury or loss of assets.

Sample Conditioning Area– Laboratory must have facility to condition test samples and substrate sheeting materials at the following conditions for 24 hours: 65 (± 10) degrees F and 50-65 % relative humidity. Ideally, the test area should contain the same conditions as the conditioning area or tests should begin within 10 minutes of removal from sample conditioning area. Note that these conditions are different than the conditions specified in the latest (Oct. 2004) draft of Technical Bulletin 604.

Test Equipment:

Load Cell/Weighing Device (See Annex C of standard)– Technical Bulletin 604, Sections 1 and 2, are weight loss versus time tests. A means of weighing the specimen and providing a display of the electronic or manually derived output is needed. The device must be capable of accommodating the entire test frame with the specimen in place and the weights of all items other than the specimen itself must be routinely tarred out before any test begins.

Load cell must be able to read to a tolerance of 1.0 (± 0.5) grams.

For the purpose of the TB 604 P&B study, the load cell must be capable of recording the weight at the rate of at least once every second with readings taken at least every 5 seconds so that a continuous weight loss curve can be generated.

Data Collection –A computer with data acquisition software (RS –232 or other appropriate software interface) capable of capturing weight loss versus time data and generating weight loss vs. time graphs is recommended. Manual data collection is acceptable as long as readings can be taken at intervals of 15 seconds or less but intervals of 5 seconds are recommended if physically possible. This method will require two analysts. For statistical purposes, data intervals should be measured and reported as close to 5 second intervals as possible to allow the statistician maximum flexibility to statistically analyze the data. Readings only at 3 minutes and 6 minutes will not provide robust data.

Note: While the Bureau does not endorse any particular brand of equipment, the laboratory uses the following weight measurement scale:

AND High Capacity Industrial Scale Model HP-20K
Resolution 0.1 grams., Capacity 21000 grams (price = $2200 in 2002)
You may also need a GP Extension Cable (GP-07)

If you have other applications you can buy higher capacity ones with the same resolution e.g.: Model GP-30 KS which has capacity of 31000 grams. The display update rate of this unit is 5 times per second.

One may specify a scale with detached indicators.

Vendor:
Precision Weighing Balances
10 Peabody Street
Bradford, MA 01836-7614
Gary Shane
1-800-881-9570

Note: Scale used must meet specifications in latest version of TB 604 standard and in this document, regardless of the brand or type.

Catch Pan - A catch pan approximately 20 inches by 24 inches made of 1/32" thick steel is needed to act as the base for holding test samples and catching molten drips and burn debris. The pan should contain a 1-inch lip to prevent liquids from spilling onto the hood surface and is fully covered with aluminum foil before each test.

Insulating Board – To prevent the heat from burning specimens to penetrate into the weighing scale, an insulating board approximately ¼ to ½ inches thick and 20 inches by 20 inches is placed below the metal catch pan and on top of the load cell to prevent heat sink effects. The insulating board can be wood or other materials such as cement board. It is covered with aluminum foil to prevent absorption of organic residue into the board.

Butane Gas Flame Ignition Source and Gas Train

- The burner tube shall consist of a length of stainless steel tube, 8.0 ± 0.1 mm (5/16 ± 0.004 in) outside diameter, 6.5 ± 0.1 mm (0.256 ± 0.004 in) internal diameter and 200 ± 5 mm (8 ± 1/4 in) in length, connected to a cylinder containing butane.
- C.P. Grade butane, 99.0% purity with 2-stage regulator shall be provided.
- The following items are required to connect the butane cylinder to the burner tube: flexible tubing (7.0 ± 1.0 mm (1/4 ± 0.04 in) I.D. and the needed length), a mass flow

- meter (optional), a fine adjustment needle valve, an on-off valve (optional) and a cylinder regulator capable of providing a nominal outlet pressure of 2.8 kPa (28 mbar).
- The flow rate of butane shall be 45 ± 2 ml/min (354 ± 16 CFM) at 23 °C (73 °F), which produces a flame height of approximately 35 mm (1 3/8 in) (measured from the center end of the burner tube when held horizontally and the flame allowed to burn freely in air).

NOTE: The following specific items have been found to be satisfactory for the butane gas train: Air Products CP grade, 99.0% purity butane, 20 lb. cylinder; Matheson 2-stage regulator, Model 8-2-510; Matheson 9.0 kPa pressure gauge, P/N 63-3103; Matheson fine control valve, brass, Model 4170 series; Matheson mass flow meter, Model 8112-0422, 200 standard cubic centimeter (sccm) range (a mass flow meter has been found to be particularly useful for resetting the butane flow from day to day). The Bureau does not endorse any particular brand of gas or gas delivery equipment.

Timer – An accurate and reliable time display/recording device such as a stop watch or preferably a digital timer is required. If collecting data manually, a digital timer is recommended to facilitate accurate data generation, as a reminder of test progress and to provide a time stamp if videotaping is being done.

Thickness Measurement Plate (See Annex D)– A square plate made of 1/8 inch thick Plexiglass (acrylic) board with dimensions 305 mm by 305 mm (12 in. by 12 in.) is needed to set the thickness of the test cushion specimens uniformly and consistently. The plate should contain a small square or round handle in the center of one side to lift and position the plate over the layers. The total weight of the thickness measurement plate shall be 325 (plus or minus 25) grams.

Digital Camera – Laboratory should have access to a digital camera to preserve permanent records of each sample, both before and after testing. These digital photographs will become a part of the permanent test record to document anomalies or unusual observations of burning behavior.

Video Camera – Optional but helpful to record all or portions of tests, show test progress and document unusual observations of burning behavior.

Laboratory Personnel- Laboratory should be capable of efficiently and accurately conducting and reporting flammability tests. Blank test report sheets will be provided by the Bureau and should be reviewed and signed by a responsible Laboratory Manager prior to returning to the Bureau.

Training- Laboratory personnel from selected laboratories will be encouraged to travel to the Bureau of Home Furnishings and Thermal Insulation Laboratory in North Highlands, California for a pre-arranged, one-day training session at the participating laboratory's expense. In lieu of traveling, a training video will be made available to each of the participating laboratories.

Costs – Laboratory cannot expect to be compensated monetarily or in any other respect, for participating in this study. Participation is truly voluntary and is done for the purpose of assisting the Bureau in development of a robust bedclothing standard. All costs related to study planning, training, testing, out-of-pocket supply and material expenses (gases, etc.), sample disposal and report generation must be borne by the participating laboratory.

Timetable- Bureau will prepare and ship, at its own expense, all samples to participating laboratories. Each laboratory will agree to follow the time deadlines set by the Bureau for completion of testing and reporting of results. The Bureau anticipates that testing by individual laboratories will begin as early as January 2006.

Bureau Contact – Questions regarding these specifications should be directed to:

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